GENERATIVE AI & ML MODELS FOR 6G COMMUNICATIONS AND INTERNET OF EVERYTHING (IOE)

Dr. Sowmya Naik[1], Ms. Sathya M[2], Prof. B. Sakthivel[3]*, Prof. B. Ramesh[4], Prof. C. Prakash Narayanan[5]

Abstract

At a faster rate than any previous mobile generation, 5G is expanding. Our independent is to role of service providers in managing this ongoing significant traffic growth while lowering energy consumption as new use cases emerge. For industries like manufacturing, minerals extraction, energy utilities, marine and processing, airports, shipping terminals, smart cities, the health care sector and more, outstanding performance communications are the building blocks of digital transformation. In order to enable the acceptance, use, and expansion of newand developing, data-driven technologies, private 4G and 5G networks offer dependable, secure, and agile connection. Wireless communication service providers are facing new hurdleswith the arrival of 5G and incorporating Artificial Intelligence capabilities into networks is oneway the sector is addressing these complications. Researchers are now focusing on 6G as the rate of deployment of fifth generation (5G) infrastructure rises and standards move further to steady state. The buzz in the field of research has been sparked by new use cases and the possibility for performance gaps. Early efforts are focused on important foundational research that will help achieve target objectives for the next generation of communication networks. Our objective is to assist service providers in controlling this persistently significant traffic growth while lowering energy usage. To develop cutting-edge network solutions that let serviceproviders launch new services while emitting fewer greenhouse gases. This paper focuses on ubiquitous AI, which could significantly alter the upcoming 6G network. An effective networkis needed to deliver the higher rates and reduced latency performance improvements. Cutting-edge a situation when there is a lot of interference, the network's infrastructure must dynamically distribute resources, modify the flow of traffic and process signals. By enhancing networks and developing new waveforms, Artificial Intelligence (AI) as well as Machine Learning (ML) models will serve as a key enabler of 6G technology. The goal of the work items under consideration for this research is to give the Indian industry the boost it needs to establish an ecosystem through requirement and awareness building, validation, the incubation process and product-market acceleration in the areas of 6G, green technologies, quantum communication and future oriented Passive Optical Network Architecture.

Keywords: Artificial Intelligence, Machine Learning, 6G, Quantum Communication, Passive Optical Network.

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A Framework of Mongodb For Handling Big Data And Development of Mongosight For Providing Easy Operations

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Abstract : With the emergence of Big Data, the use of NoSQL (Not only SQL) technology is growing Fast among internet companies and other enterprises. The Benefits are simplicity of design, horizontal scaling and control over availability.NoSQL databases are increasingly considered a viable alternative to relational databases, as more organizations recognize that schema less data model is a better method for handling the large volumes of structured, semi structured and unstructured data, being captured and processed today. For example NoSQL databases are often used to collect and store social media data.The aim of the project is to introduce the concept of NoSQL, which provides a review of relevant literature, highlights the different NoSQL database types, and provide arguments for and against adopting NoSQL.A small prototype has been developed to assess the stated NoSQL features and illustrate the differences between the SQL and NoSQL approaches. The last section of the paper offers some conclusions and recommendations for further research which helps to expand upon our research work.

Index Terms: NoSQL, SQL, databases, structured data, unstructured data, Big Data

I. INTRODUCTION

Big Data is a phrase which refers to a large volume and wide variety of data being captured from different sources at high speed. It is estimated that data volume is increasing 40% per year, and will grow 44 times between 2009 and 2020 [1]. Much of this data is of a textual nature and hence unstructured. With the emergence of Big Data, the use of NoSQL technology is rising rapidly among internet companies and the enterprise. Benefits include simplicity of design, horizontal scaling and finer control over availability. NoSQL databases are increasingly considered a viable alternative to relational databases, as more organizations recognize that its schema less data model is a better method for handling the large volumes of structured, semi structured and unstructured data, being captured and processed today. For example NoSQL databases are often used to collect and store social media data. The purpose is to introduce the concepts, highlight the different NoSQL database types, and provide arguments for and against adopting NoSQL. Hadoop deals with big data which is an open source Java framework. Big Data usually includes data sets with sizes beyond the ability of commonly used software tools to capture, accurate, manage, and process data within a tolerable elapsed time. There are two core components in it namely: HDFS (Hadoop distributed file system) is the ability of a system to continue normal operation against hardware or software faults using inexpensive hardware and which stocks huge extent of data another one is MapReduce is a processing technique and programming model done in lateral and scattered manner. MapReduce provides a standardized framework for implementing large-scale distributed computation, namely, the big-data applications.

II. BACK GROUND OF NO SQL

NoSQL databases are non-relational and accommodate unstructured data. It is not a replacement for an SQL database but compliments it; both technologies can coexist. The key difference is that relational (SQL) databases have rigid schemas while NoSQL databases offer a flexible schema design that can be altered without downtime or service disruption. NoSQL was also designed for distributed data stores for large scale data needs; for example Facebook has 500 million users and Twitter accumulates terabytes of data. NoSQL takes advantage of scaling out, by spreading its load over many database servers, and this is an inexpensive solution for large datasets. However in comparison to relational databases, NoSQL databases do not have the same distinct properties or data integrity [2]. In spite of this NoSQL databases have an established track record for handling Big Data efficiently.The primary way in which NoSQL databases differ from relational databases is the data model; there are numerous NoSQL databases [3] and they primarily fall into the following four categories:Key Value Databases use a hash table where there is a unique key and a pointer to a specific set of values; data can only be queried by the key. The data can be unstructured, as it does not enforce a set schema across key value pairs. Facebook uses this database type, as the datasets are not related to each other and the data is unstructured. The simplicity of this database type makes it ideally suitable for fast highly scalable retrieval of values needed for application tasks like managing customer profiles and

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Wearable Device using AI and IoT for Assessment of Fetal & Maternal Well-being During Pregnancy

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ABSTRACT: The maintenance of good health for both the fetus and mother proves to be essential in pregnancy for preventing as well as identifying potential complications. To achieve this goal, effective monitoring needs to be implemented that takes into account these concerns. Pre-eclampsia, a serious complication occurring typically after 20 weeks gestation, involves increased blood pressure alongside proteinuria. When untreated untoward effects on both the mother as well as further fetal development may ensue. Effective monitoring of maternal and fetal health is vital during pregnancy. This includes regular monitoring for parameters such as fetal heartrate and gestational diabetes. Therefore, constant innovation is necessary for developing seamless technological solutions capable of facilitating accurate tracking continuously. This research paper signifies the importance of monitoring maternal and fetal health during pregnancy, with a focus on pre-eclampsia, fetal heart classification, and gestational diabetes. The system we propose is a wearable belt equipped with AI and IoT technologies to continuously monitor the mother's health vitals, analyze them, and send the data to ThingSpeak, an IoT-based cloud platform. We have developed ML models for fetal heart classification and various risks during pregnancy to provide insights into the health of both mother and child. The data is integrated into our web application, Growing Together, which has two dashboards for mothers and doctors. The mother's dashboard displays the health vitals from the IoT device, along with recommendations for well-being such as exercise and diet. The doctor's dashboard includes the ML models to classify fetal heart rate and predict the risk of pre-eclampsia and gestational diabetes. Our solution aims to reduce the need for hospital visits while improving early detection of potential health issues, aiming to provide easy to access, cost-effective and user-friendly solution mainly to women with restricted access to healthcare facilities. Our research demonstrates the potential benefits of wearable technology in promoting early detection of complications, providing recommendations for healthier pregnancies, and improving overall health outcomes for expecting mothers and their fetuses.

KEYWORDS: Sensors, IoT, Machine Learning, Decision Tree Classifier, Health monitoring system, Fetal Heartrate, Pre-eclampsia, Gestational diabetes.

I. INTRODUCTION

Regular monitoring throughout the pregnancy allows early detection of well-being problems that might arise and will aid their treatment, improving the chance for the birth of a healthy baby. The health and condition of both the mother and the
baby is a clear indication of future complications or the well-being of the fetus [1]. Routine check-ups are advised by doctors during pregnancy for monitoring of health vitals like blood pressure, heart rate, body temperature etc., frequently in order to ensure the well-being of both mother and her fetus. An abrupt and sudden increase in blood pressure levels during pregnancy can result in a medical condition known as Preeclampsia and unhealthy eating habits along with mood swings and other external conditions may cause the BP level of pregnant women to increase due to certain changes occurring in their bodies. The presence of preeclampsia increases the risk for proteinuria and seizures which may end up causing maternal death or even fetal loss [2]. To identify fetal distress during labour or delivery period; it's necessary to monitor Fetal Heart Rate (FHR) using a Doppler device, however, when it comes to documenting FHRs in practice today there's no more common method than Cardiotocography (CTG). Neglecting to

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An Efficient and Robust Machine learning Framework for High-Dimensional Data Exploration and Analysis

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Abstract:- High-dimensional data poses significant challenges in analysis and interpretation due to the abundance of features and potential noise. This research introduces an innovative and robust machine learning framework tailored to explore and analyze high-dimensional datasets efficiently. This study proposes an innovative computational framework utilizing numerical modeling to create an environment for exploring High-Dimensional Data (HDD) during gene expression analysis. The framework's design involves complex data analysis by assessing a learning model using a streamlined workflow and practical predictive analysis. The primary objective is to improve the computational efficiency of workflow modeling by optimizing intrinsic elements and enhancing feature selection performance, thereby positively impacting data clustering and learning stages. The system also conducts effective pre-processing of gene expression data, aiding in the accurate identification and selection of informative genes during training and classification phases. In our research, we conducted a comparative analysis of various methods, including RBF, MLP, and SVM, to develop a robust machine-learning-based gene expression analysis system.

Keywords: *High-Dimensional Data (HDD), Machine Learning, Gene expression data, Feature Selection.*

1. Introduction

Analyzing microarray datasets presents significant challenges for researchers, primarily stemming from the high-dimensional nature of the data, characterized by a limited number of samples with thousands of features. Traditional classification techniques often struggle to handle such datasets effectively. Additionally, various experimental obstacles further contribute to the complexity of microarray data analysis, making it a captivating and intricate domain for researchers. The emerging computing technologies have enabled researchers to work with complex raw gene expression data where expression levels of complex gene sequences can be analyzed simultaneously to ease the data profiling approaches. Complex medical data exploration is a paradigm of exploring and finding the most significant pattern in the gene expression attributes so that informative data patterns can be easily obtained for computation and decision-making [1][2]. The complex data analysis process also involves various methods to eliminate redundant and irrelevant entities to simplify the classification process. However, it is being observed that for the traditional statistical approaches of computing the gene expressions, complex HDCD analysis related to gene expression is challenging. The problem is due to the curse of dimensionality and sparsity problem, which affects classification performance in the long run [3]. The existing techniques of complex gene data exploration and classification processes mainly involve computational approaches for feature identification and selection. These are highly iterative and pose difficulty during the learning phase. They do not ensure timely execution and a better classification rate.

On the other hand, if data is not pre-processed correctly, it also affects the classification performance due to many factors, such as noisy entities, redundant outliers, and many more. Therefore, before the computation of features from the HDCD, the dimension reduction with respect to noisy data removal is highly envisioned to make appropriate classification outcomes to help decide a better treatment plan for a patient by the medical practitioner

Heart Disease Prediction Performance Analysis Using Machine Learning Algorithms

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Abstract - Medical diagnosis is considered as important but difficult task to be achieved efficiently and effectively. The automation of this task can be very helpful. Unfortunately, all physicians are not experts in all subject specialists and might face scarcity of resources at some places. Data mining can be used in these cases to find hidden patterns and decision knowledge that may contribute to successful decision making. This plays a key role for healthcare professionals in making accurate decisions and providing quality services to the public. The approach provided by the health care organization to professionals who do not have more knowledge and skills is also very important. One of the main limitations of existing methods is the ability to draw accurate conclusions as needed. In our approach, we are using different data mining techniques and machine learning algorithms, Naïve Bayes, k Nearest Neighbor (KNN), Decision tree, Artificial Neural Network (ANN), and Random Forest to predict and analyze the heart disease based on some health parameters.

Index Terms - Naïve Bayes, k Nearest Neighbor (KNN),SVM(Support Vector Machine), Decision tree, Artificial Neural Network (ANN), Random Forest

I. INTRODUCTION

Heart disease is one of the major cause of deaths both locally and globally. More people die annually from CVDs than from any other cause, an estimated 12 million people died from heart disease every year this heart disease kills one person every 34 seconds in the United States of America. Heart attacks are often a tragic event and are the result of blocking blood flow to the heart or brain. People at risk of heart disease may show elevated blood pressure, glucose, lipid levels as well as stress. All of the separate meters can be easily measured at home by basic health facilities. Among some Coronary heart disease, Cardiomyopathy and Cardiovascular disease are the different types of heart disease. The word "heart disease" includes a variety of conditions that affect the heart and blood vessels and how the fluid gets into the bloodstream and circulates there in the body. Cardiovascular disease (CVD) causes many diseases, disability and death. Diagnosis of the disease is important and complex work in medicine. Risk factors for heart disease are common and include poor diet, smoking and family history.

There are many risk factors for heart disease including age, gender, genetics, diet and exercise habits:

- People with a family history of heart disease have a higher risk than those without one.
- Heart disease are common and include poor diet, smoking, lack of exercise, high blood pressure, diabetes, and family history.
- Increased age will also increase a person's risk for heart disease.
- Unhealthy practices eating lots of junk food and consumption of drugs.

Machine learning is a part of artificial intelligence (AI) that gives computers the ability to learn without being explicitly programmed using training data sets. Machine learning focuses on the development of training and testing data sets that can learn when exposed to new data. In this paper, we go through basics of Machine Learning algorithm and there analysis on Heart diseases training set.

TYPES OF MACHINE LEARNING:

Machine learning is a subset and a part of AI, which enables the machine to automatically learn from training data, improve performance from past experiences, and make predictions to future analysis. Machine learning gives many algorithms that can work on large amount of data. These data are provided to these algorithms to train them, and on the training, they build the model & perform a specific task given by the user. These ML algorithms help to solve different problems in many areas where it requires analysis like Regression, Classification, Forecasting, Clustering, and Associations, etc.

Machine learning algorithms are divided into four types,

- Supervised Machine Learning
- Unsupervised Machine Learning
- Semi-Supervised Machine Learning
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ABE Cloud Privacy Improvisation on Healthcare Systems Using Trained Neural Networking Technique

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Aims and scope

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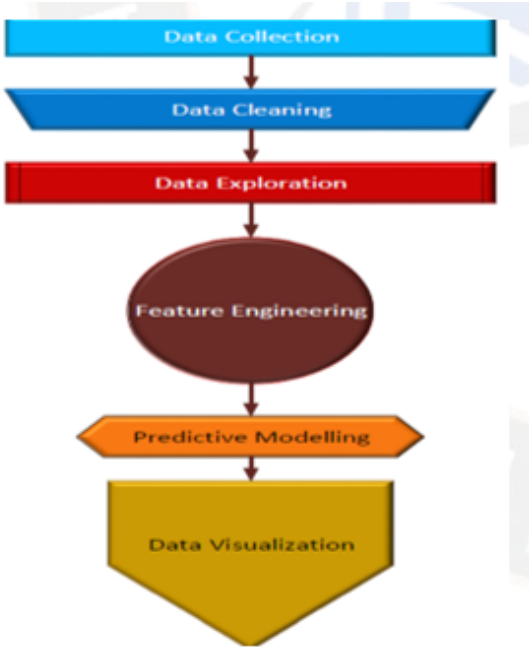
M. H. Chaithra & S. Vagdevi

Abstract

Healthcare organizations deal with sensitive data and patient information shared via medical servers and Electronic Health Records (EHR). The data on cloud are unsecure as it operates on multi-user recommendations. In this paper, a machine learning technique is upgraded using Attribute Based Encryption (ABE). The proposed technique extracts datasets from pre-trained repository of eHealth datasets and extracts the feature-to-attribute relationship. The processed attributes are termed as coordinated dataset attributes as primary attribute. The proposed ABE improvisation is appended over the trained neural networking (TNN) framework for dataset optimization and re-indexing. The proposed technique is developed and implemented on Kaggle's patient treatment classification dataset and compared with existing techniques. The proposed technique has

Real-Time Streaming Analytics using Big Data Paradigm and Predictive Modelling based on Deep Learning



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Keywords:
Apache Flink, stream processing, real time streaming, streaming analytics, predictive modelling, deep learning

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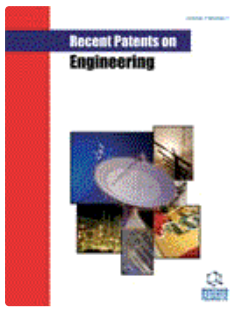
Abstract

With the evolution of distributed streaming platforms analysing humongous time series data, which is streamed continuously from IoT devices become lot easier. In most of the IoT networks the data are in motion or in data centre/cloud. It is possible to process this data in real time similar to edge devices using the big data framework. In data intensive applications predictive analytics require more resources to perform complex computations. Apache Flink framework is capable of performing real time streaming of schema less data and scales very high in distributed environment with low latency, it is used to collect and store the data in the cloud.



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Research Article

CAML: Cryptographic-Based Cloud Security for Healthcare Data with Machine Learning Technique

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Abstract

Tribological Studies On Sub-zero Treated A356-ZrO2 MMC

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Abstract: Aluminium matrix composites (AMCs) have strong physical and mechanical qualities, making them potential materials for a variety of applications. In comparison to traditional engineering materials, the metallic matrix's specific strength, stiffness, creep, wear, and fatigue properties are improved by the insertion of reinforcements. This study presents the effect of the addition of weight percentages of ZrO_2 on the tribological properties of A356 aluminium alloy. Composite material with ZrO_2 reinforcement with weight percentages, 2%, 4%, 6%, and 8% utilising the stir casting process Further, these castings were cryotreated at -196^0 C. ZrO_2 addition and cryotreatment improve the hardness of this material. The sliding wear behaviour of this material was investigated at room temperature by using pin-on-disc tribometer. Wear rate, and the coefficient of friction are decreasing with the increase in the weight percentages of ZrO_2 addition. ZrO_2 addition improved the tribological properties of the aluminium metal matrix composite materials.

Keywords: A356/ZrO_2MMC; Wear rate; Frictional force; Coefficient of friction; Hardness.

1. INTRODUCTION

A356 is a hypoeutectic aluminium alloy widely used in the structural and flow parts of cars and aeroplanes. By creating (AMMCs) aluminium metal matrix composites using ceramic reinforcements, the tribological and mechanical of these alloys are improved. Studies have regularly experimented with silicon carbide (SiC), alumina (Al_2O_3), carbon nanotube (CNT), boron carbide (B_4C), also with graphite (Gr) as reinforcement materials in the matrix of the A356 alloy in a number of research papers. Because of the improved secondary dendrite arm spacing of alpha Al dendrites also the eutectic Si phase within the matrix, AMMCs based on A356 frequently display improved mechanical properties [1].

The manufacturing techniques and post- treatment of materials have generally been responsible for the variations in the morphology of the A356 alloy. Compo casting, stir casting, and squeeze casting of liquid phase processing, and cold upsetting, and hot isostatic compression in the solid-state fabrication methods are the generally utilised manufacturing procedures to create AMMCs. To prevent agglomeration of the reinforcement particles within the matrix material, process variables in various production methods are to be managed. According to the literature [2, 3], the squeeze casting and compo casting techniques significantly lessen the likelihood of reinforcement agglomeration.

According to Yuan et al. [2], the area of the SDAS was decreased and the dispersion of the nano SiC particles within the matrix was uniform after 3 minutes of ultrasonic vibrational treatment on the composite and 400 MPa of squeeze pressure. According to [4], alpha- aluminium crystal refinement improved the ductility and strength of the composites. The SiC reinforced particles are discovered at inter- dendritic sites following solidification, according to Ghandvar et al. [3]. Their study also showed that Si eutectic phase was refined, and that only a small percentage of Si phase is nucleated on SiC particles, this decreases the material's toughness.

According to Arda and Kalkanli [5], the SDAS of A356 decreased with greater solidification rates. Additionally, they have observed that when the SDAS was determined as smaller than the typical dimension of the reinforcements, the tendency to cluster rises.

According to reports, the near-fast solidification, also thermomechanical treatments of the melt resulted in the eutectic Si shrinking to the nanoscale and improving in characteristics. The long columnar dendritic of alpha alumina has been polished and converted into a spherical shape using T6 treatment and ultrasonic vibration treatment of composites [6]. It has been proven that in situ manufacturing methods are a

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Feasibility Study on Mechanical Properties of Date Palm Fiber and Epoxy Bio-Composite for Automotive Applications

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Abstract

In Gulf countries such as Saudi Arabia and the Sultanate of Oman, date palms are a major agricultural crop. There is a considerable supply of date palm stems and leaves as agricultural residues. It may be easy and affordable to harvest a large amount of fiber from stem and leaves of date palm trees, which are common in the Al Batinah region. Moreover, they have durability and a variety of textures on the strands. In terms of the use of waste materials and environmentally friendly disposal, the use of natural fibres derived from renewable resources is beneficial to the environment. Natural fiber composite materials have become a focus of research and development due to their availability, widespread use, renewable nature, cost effectiveness as well as ecofriendliness. Thanks to their balanced mechanical properties, the use of composite materials in vehicles, aircraft, marine and civil structures is becoming more common. The fibres must be reinforced with polymers to ensure properties such as compression, impact strength, hardness and flexural flexibility of composite materials. Therefore, for the above specified mechanical properties, the strength of the composite produced from DPFs of local varieties shall be tested in this case. In order to obtain a good natural polymer composite which can be used for a variety of applications, the main objective is to find a way to use waste palm tree fibres to obtain a good natural polymer composite.

Keywords: Date palm fibre, Bio-composites, Flexural strength, Epoxy binder, Impact strength.

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Hybrid Advances

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A comparative study on the effect of reinforcing boron nitride/alumina in epoxy-based hybrid composite with Millettia pinnata leaf powder and glass sheets: Experimental fabrication, mechanical and micro-structural characterization

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Abstract

The present study focuses on the fabrication and characterization of an innovative epoxy-based hybrid composite, designed to enhance its mechanical properties by incorporating three distinct reinforcing agents that are Millettia pinnata leaf powder, alumina/boron nitride particles, and glass sheets. This hybrid composite aims to combine the individual strengths of alumina/boron nitride particles reinforcements, ultimately achieving a superior material with enhanced mechanical strength. The selection of these reinforcements was based on their unique properties, such as biodegradability and eco-friendliness of Millettia pinnata leaf powder, high strength-to-weight ratio of alumina/boron nitride, and excellent mechanical properties of glass sheets. The optimized weight fraction of each reinforcement was determined through a series of